we have lived, exist and are in process of creation, that the futility of attempts to force our views upon you must be apparent. As I see the great struggle now it is not only between democracy and imperialism, but underlying this a still greater struggle between socialism and individualism. This is apparent in medicine as it is in every other domain of life and what will be the outcome no man can say. The currents in the sea are so vast in extent and power, the winds so variable, that there is the temptation to merely stand aloof and be swept along. I think I can advise you, reluctant as I am to attempt advice, to resist this; plunge in and struggle for what seems to you the right, remembering that general conditions of social environment depend upon the actions of individuals and it is you who are the creative force—on you rests the responsibility.

With this as a preamble it would give me great pleasure to pursue the subject further, for I really like to talk, and as I look around and see you I recall many happy hours which are associated with you and I am grateful to you for having given me this happiness. But fortunately for us all time passes, changes, it is now gone, and I have been spared the chance of giving you opinions which are probably erroneous and possibly productive of injury.

I think, however, it is only right that I should tell you that addresses may have a great importance and even determine future events, as the following example shows. Some time ago I happened to be in the capital of a Brazilian state just after a gubernatorial election. There had been the usual phenomena which such an event in a Brazilian city produces. Some fifty people killed, three times as many wounded, a newspaper office blown up and on numerous houses the peculiar pits made by the modern jacketed bullet. At the time I reached there, two weeks after the inauguration, everything was going on as usual. It seems that full arrangements were made to blow up the governor on his way home after the inaugural address. But the importance of the address had not been properly considered. The governor spoke long, giving the history of the country from its discovery, the modern conditions and the hopes of the future. The matter was dull, hours which seemed like weeks and minutes which seemed like days passed and he continued to speak without the audience being able to see any hope of cessation. The conspirators were nervous, the exciting events had deprived many of them of their wonted calm siestas, and under the soothing influence of the orator many slept; others were not able to endure the absence of alcohol for so long a period and these departed to look for it; for others so long a period of silence on their part could not be endured and these departed to gather up an audience; others felt they might be missed at home and these sought the presence of the household gods. In short the conspiracy was broken up, the audience gradually departed with the taxis which were to have formed the procession, and the governor was finally left speaking to a single close friend who went home with him by a back way, and the country for a time was saved. The party newspapers which printed the speech said it was a masterly effort; the opposition was silent, for their newspaper had been blown up.

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SOME SUGGESTIONS FOR NATIONAL SERVICE ON THE PART OF ZOOLOGISTS AND ZOOLOGICAL LABORATORIES

IN an article in the *New Republic* for March 31 last entitled "America Prepares" William Hard pokes fun at the enthusiasm for organization which has taken possession of the coun-

try; the National Research Council receives its share of serio-comic attention and as a climax of the ridiculous and absurd there is mentioned the Committee on Zoology and Animal Morphology. "I doubt," he says, "if any other nation ever responded to the prospect of war with a scheme of national defense which included a Committee on Zoology and Animal Morphology."

It should not be forgotten that the establishment of the National Research Council antedated the declaration of war by a whole year and that one of its chief functions was and is the promotion of research in all branches of science in the belief that human progress depends upon increasing knowledge of nature and that national welfare can be advanced most effectively by the cooperation of scientific investigators.

With the country at war it is but natural that the activities of the Research Council should be directed primarily to problems connected with the war and patriotic men and women in all branches of science, as well as in every other occupation, are asking how they may best serve the nation in this crisis. Zoologists, no less than others, are asking this question and it is with a view to answering it in a general way that the Committee on Zoology of the National Research Council has drawn up the following suggestions.

To the zoologists no less than to the *New Republic* it is evident that this science is only indirectly and remotely related to war—indeed it has been claimed that hitherto the biological sciences are the only ones which have not been used for the destruction of human life. The greatest national service which the biological sciences can render in war as well as in peace is in conserving human life, and also in protecting and improving useful animals and plants and in controlling or destroying injurious ones; when it is remembered that practically everything which we eat or wear comes from animals or plants it will be realized that this is no slight service.

Many of the practical and economic branches of biology have long been well organized for such service and this applies particularly to medicine, sanitation and agriculture, but in each and all of these branches the trained zoologist may render valuable aid. Probably no other scientific men are better prepared by training and no other institutions better fitted by equipment to assist in medical and sanitary work than are zoologists and zoological laboratories, and in the matter of the propagation and improvement of useful animals and the destruction of useless or injurious ones the zoologist should be especially at home. In many instances zoologists who have hitherto confined their attention to theoretical and general problems would need to turn their attention to new lines of work, but it can not be doubted that practise in solving general and theoretical problems would be of great value in dealing with specific and practical ones.

I. SANITARY WORK

1. Much sanitary work is primarily zoological as, for instance, the study of the life histories of parasitic protozoa, tapeworms, flukes, roundworms, insects, mites, etc., together with methods of their control or eradication.

2. The elimination or control of animal carriers of disease-germs, such as flies, mosquitoes, bugs, fleas, lice, rats, etc.

3. Assistance in medical diagnosis, as in the microscopical or chemical examination of blood, urine, feces, sputum, etc.

4. Microscopical or chemical examination of water and soil of camp sites, drainage areas of cities, etc.

5. The zoological aspects of the collection and disposal of garbage and sewage.

In view of the importance of zoological science in dealing with old and new problems which will arise in connection with sanitation it would be very desirable to have at least one trained zoologist connected with the medical staff of each mobilization camp.

II. AGRICULTURAL WORK

1. Cooperation with the agricultural agencies of the states and nation in the elimination of animals which prey upon or are parasitic upon domestic animals; of animal pests destructive to crops, fruits, forests, to stored vegetables, grain and other food supplies, to

clothing, woodwork and other manufactured products.

2. Application of principles of heredity to the improvement of breeds of domestic animals.

3. Study of physiology of reproduction with a view to increasing productivity in animal breeding; for example, improved methods of incubation, brooding and rearing of fowls.

4. Determination of standards of feeding and nurture of domestic animals for best general or specific results and for greater economy.

III. EXTENSION OF FOOD SUPPLY

1. Preservation, propagation and domestication of useful wild animals. Probably certain useful birds and mammals, now wild, might be domesticated; others not native might be imported under proper precautions.

2. The protection of birds which are beneficial to agriculture. It is estimated that in Kansas alone the annual preventable damage to food crops amounts to thirty million dollars. The largest natural elements in the prevention of this loss are ground-nesting birds. Migratory birds should be protected by the passage of the House of Representatives Bill No. 2612, known as the "Migratory Bird Treaty Act."

3. Exploitation and propagation of useful marine and fresh-water animals, in cooperation with the Bureau of Fisheries. There is an unlimited supply of food in the oceans of the world and we have scarcely begun to reap the "harvest of the seas." Countless forms of fishes, crustacea, mollusks and other types which are not now generally used as food are both wholesome and delicious when properly prepared. The Commissioner of Fisheries says:

> Zoologists may perform a service by bringing to the attention of people, in the course of their conversations, lectures, etc., the reasons for looking to the fisheries for increased food supply, the wholesome character of the meat, the economy with which fish are produced without dependence upon agriculture for their food. Many new fishes are being introduced into the market—sharks, bowfin, burbot, sable-fish and others, and it is certain that zoologists can do a good service in helping to overcome popular inertia that will be encountered. The Bureau will gladly send circulars announcing new fishes to any who apply.
>
> The biological problems of fish ponds are numerous. Recently a college zoologist in association with the Bureau began giving special attention to the relation of dragon flies and damsel flies to fish culture in ponds. Already he has gained results that were unexpected, but that are highly significant. The larvæ of dragon flies were known to prey upon fish fry, but this investigator, Professor C. B. Wilson, finds that they also prey in greater measure upon other insects that are more effective enemies of fish fry; various other interesting interrelations are discovered This is only an illustration of what may be done with various groups of aquatic and semi-aquatic animals and plants. Results of value may, in some cases, be obtainable in a brief space of time.
>
> We know very little about the parasites of fishes, their relative abundance under different conditions of environment, their life-histories and alternate hosts. Means of control can not be devised without more complete knowledge regarding particular species.
>
> We should be glad to advise either directly or through you with any zoologist who is considering a particular problem related to the fisheries.

IV. EDUCATIONAL AND SOCIAL WORK

1. Thorough studies of human heredity as a necessary preliminary to any attempt to permanently improve our human stock and increase national efficiency.

2. The teaching of zoology, as well as of other sciences, may be made a very important means of promoting national intelligence, cooperation and welfare.

3. While the great demands on medical men last, zoologists would be well qualified to assist in medical education, especially in histology, embryology and neurology.

4. The prosecution of research work, whether in pure or applied science, is a national duty of the first magnitude; the continuance of research work by zoologists, and especially work already begun which can not be interrupted without serious loss to science, is a real national service.

V. MISCELLANEOUS PROBLEMS

In addition to these general lines of work the following special problems have been suggested:

1. The microscopical inspection of food, clothing and supplies.

2. Studies of the coat coverings of animals with a view to the utilization of nature's principles in making the clothing of soldiers light, warm, well ventilated, impervious to water and protectively colored.

3. Studies of the mechanism of aquatic and aërial locomotion in animals with reference to its application to submarines and aëroplanes.

4. Utilization of gulls and other aquatic birds in locating submarines.

5. Studies of the mechanisms of limbs and joints with a view to offering suggestions in the construction of artificial limbs.

6. Investigations in tissue cultures, grafting and regeneration, with a view to their surgical applications.

The committee would welcome any further suggestions either in the line of additional problems or of practical methods of attacking those named.

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SCIENTIFIC EVENTS

SUSPENSION OF THE KEW BULLETIN

Publication of the *Kew Bulletin* has been suspended on the ground of shortage of paper. In regard to this *Nature* remarks:

When we see the waste of paper used in Parliamentary Reports, National Service propaganda, and by government departments generally, and place this by the side of the amount required for the continued publication of such a periodical as the *Kew Bulletin*—imperial in its scope and influence—we begin to despair that our state officials will ever possess true standards of value in matters pertaining to science. The subject is dealt with in an article on another page; and all we wish to say here is that we are glad to accord the hospitality of our columns to a contribution intended for the *Kew Bulletin*, and that we earnestly hope action will be taken to secure the continuance of a publication which is more essential now than ever it was.

The article mentioned says:

It must be remembered that Kew is the central institution of a great system of smaller institutes established in every region of the empire, and that these institutes exist to further the material prosperity of the countries in which they are situated. The principal sources of wealth in most of our foreign possessions consist for the most part of vegetable products, and it is difficult to overrate the importance of keeping the botanical stations, remote as they mostly are from the main channels of current scientific work, continually informed on relevant matters which from time to time reach the great clearing-house at Kew. It must be evident to everyone that any action which tends to lower the efficiency of these institutes of economic botany must operate in a manner detrimental to the material interests of the country or countries thus affected. It is difficult to believe that either the India Office or the Colonial Office, which are both concerned with the functions that only Kew is in a position effectively to discharge, can have been consulted in the matter, or, if they had been so consulted, that they could have approved of a step so unsound alike on economic and financial grounds.

Furthermore, it should not be forgotten that Kew receives a good deal from other countries by way of exchange for the *Bulletin*, which it is now proposed to suspend. We understand that enemy countries, although their colonial interests are as nothing compared with our own, have, nevertheless, not seen fit to interfere with the continued publication of their own corresponding journals.

In fact, the same official lack of appreciation of the importance of scientific inquiry and research which was a matter of common knowledge amongst our competitors before the war still continues to sap the foundations of our recognized claims to our foreign possessions, which should largely rest